

Bits Runtime

[Here is a video walkthrough of the solutions.](#)

Determine the best and worst case runtime of `tricky`.

```
1 public void tricky(int n) {
2     if (n > 0) {
3         tricky(n & (n - 1));
4     }
5 }
```

Best Case: $\Theta(\quad)$, Worst Case: $\Theta(\quad)$

Solution:

Best Case: $\Theta(1)$, Worst Case: $\Theta(\log N)$

Explanation: The main idea is that this function zeros out a 1 in n each time. If n starts off as some power of 2, it only has one 1 and finishes in constant time. If n is all ones, it takes $\log N$ recursive calls to finish (there are $\log N$ bits in N).

There are two main cases for n . First, if n is odd, $n - 1$ has a 0 in the last bit, so the last bit of n will be zeroed out. If n is even so its last bits are something like $10 \dots 0$, then the last bits of $n - 1$ will be $01 \dots 1$. and-ing these together zeros out the first nonzero bit from the right.